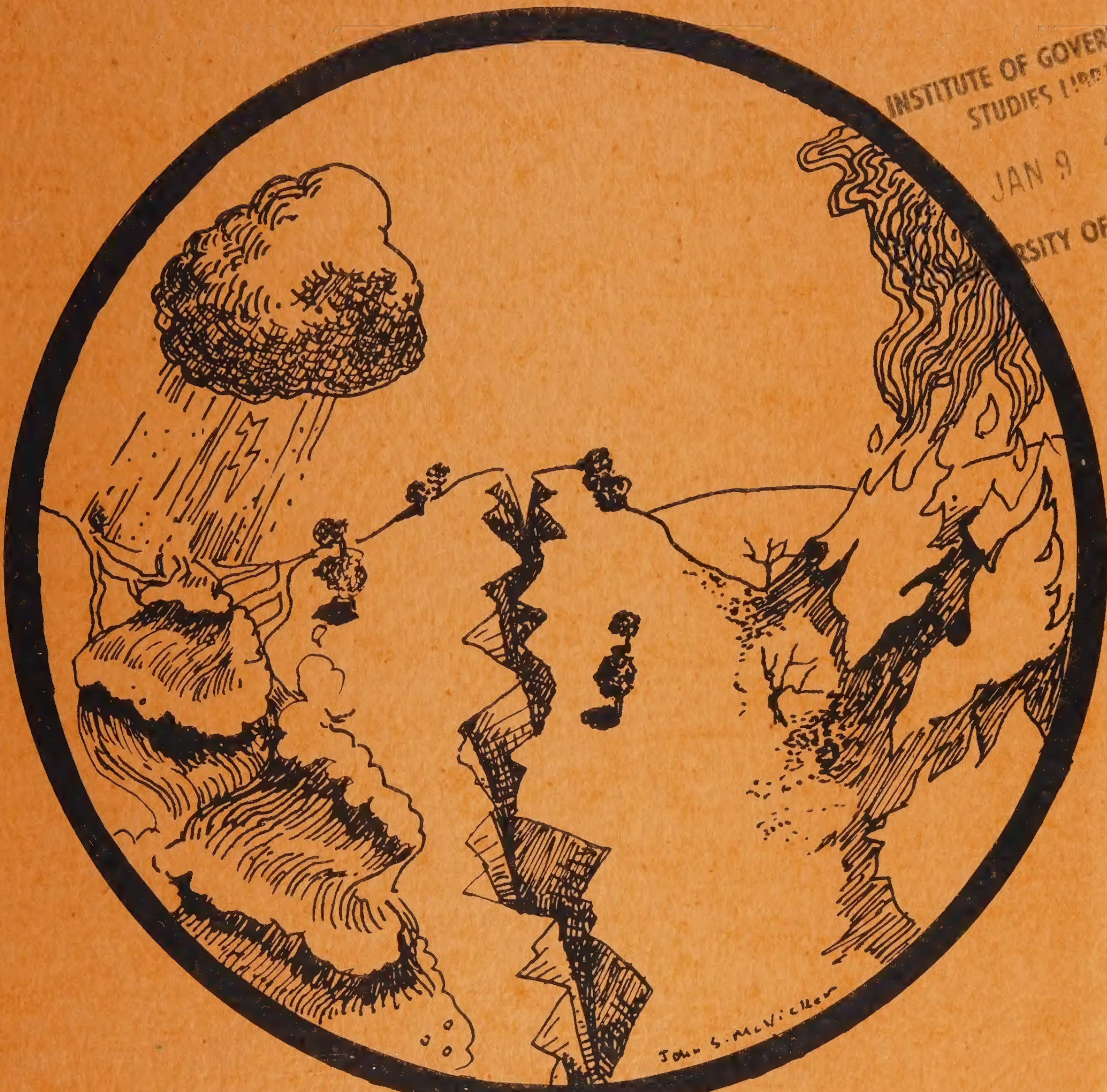
SEISMIC SAFETY AND SAFETY



ELEMENTS OF THE GENERAL PLAN

CITY OF SANTA MARIA, CALIFORNIA

79 00720

SEISMIC SAFETY AND SAFETY ELEMENTS

Santa Maria -- City planning
City planning -- California
Earthquakes -- " -- Santa Maria

CITY OF SANTA MARIA

JUNE 1977

CITY COUNCIL

ELWIN E. MUSSELL, MAYOR
GEORGE S. HOBBS, JR., MAYOR TEMPORE
WAYNE T. HESSELBARTH
ALLEN BURKE
JACK ADAM

PLANNING COMMISSION

JOSEPH A. OLIVERA, JR., CHAIRMAN
WILLIAM COUEY
R. J. RABSKA
GLENN E. SEAMAN
CURTIS TUNNELL

PREPARED BY THE COMMUNITY
DEVELOPMENT DEPARTMENT

AL AUTRY, DIRECTOR

RESOLUTION NO. 77-4387

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF SANTA MARIA APPROVING AN ADDITION TO THE ADOPTED GENERAL PLAN (SEISMIC SAFETY AND SAFETY ELEMENT)

WHEREAS, there has been submitted a proposed addition of a Seismic Safety and Safety Element to the General Plan as Element No. 8 of the adopted General Plan of the City of Santa Maria; and

WHEREAS, the proposed amendment on file with the City Council has heretofore been submitted to the Planning Commission of the City of Santa Maria, and the Planning Commission has recommended approval thereof by its Resolution No. 1205; and

WHEREAS, a public hearing on said amendment was set in the manner provided by law and duly noticed to be heard, and this Council fully heard and considered the initial environmental study applicable to said project proposal and it appeared that there would be no substantial detrimental environmental impact; and

WHEREAS, said public hearing has been held as provided by law, and this Council has heard all matters produced thereat, and has determined that the proposed addition of the said Seismic Safety and Safety Element should be approved;

NOW, THEREFORE, IT IS HEREBY RESOLVED as follows:

1. The foregoing recitals are hereby found to be true.

2. The Seismic Safety and Safety Element, in the form on file with the City Clerk, as thereafter amended by the City Council, is hereby adopted.

PASSED AND ADOPTED at a regular meeting of the City Council of the City of Santa Maria held June 7, 1977.

/s/ ELWIN E. MUSSELL

ATTEST:

/s/ DOROTHY LYMAN
City Clerk

STATE OF CALIFORNIA)
COUNTY OF SANTA BARBARA) ss.
CITY OF SANTA MARIA)

I, DOROTHY LYMAN, City Clerk of the City of Santa Maria and ex officio Clerk of the City Council, DO HEREBY CERTIFY, that the foregoing Resolution No. 77-4387 was duly and regularly introduced and adopted by said City Council at a regular meeting held June 7, 1977 by the following vote:

AYES: Councilmen George Hobbs, Wayne T. Hesselbarth, Allen Burke, Jack Adam and Mayor Elwin E. Mussell.

NOES: None.

ABSENT: None.

/s/ Dorothy Lyman
City Clerk of the City of Santa Maria and ex officio Clerk of the City Council

RESOLUTION OF THE PLANNING COMMISSION

CITY OF SANTA MARIA

IN THE MATTER OF RECOMMENDING TO CITY COUNCIL) ADOPTION OF SEISMIC SAFETY AND SAFETY ELEMENT) AS ELEMENT NO. 8 OF THE GENERAL PLAN OF THE) CITY OF SANTA MARIA)	RESOLUTION NO. 1205

WHEREAS, the California Government Code requires that each Planning Agency shall prepare and adopt a General Plan for the physical development of property; and

WHEREAS, said California Government Code specifies that the Seismic Safety and Safety Element shall be required elements of said General Plan; and

WHEREAS, the adoption of a Seismic Safety and Safety Element of the General Plan is necessary for the health, safety, and welfare of residents and property owners in the City of Santa Maria; and

BE IT FURTHER RESOLVED that the Planning Commission of the City of Santa Maria recommends City Council adoption of the Seismic Safety and Safety Element of the General Plan as submitted with this Resolution.

PASSED AND ADOPTED at a regular meeting of the Planning Commission of the City of Santa Maria, held May 18, 1977, by the following roll call vote:

AYES: Commissioners R. J. Rabska, Glenn Seaman, Curtis J. Tunnell, William Couey, and Joseph A. Olivera, Jr.

NOES: None.

ABSENT: None.

/s/ Joseph A. Olivera, Jr.
JOSEPH A. OLIVERA, JR., CHAIRMAN
City Planning Commission

ATTEST:

/s/ AL AUTRY
AL AUTRY, Secretary
City Planning Commission

I hereby certify that the above Resolution No. 1205 was adopted by the Planning Commission of the City of Santa Maria on May 18, 1977.

/s/ AL AUTRY
AL AUTRY, Secretary
City Planning Commission

CONTENTS

APPENDIX

THE FOLLOWING ARE APPENDICES TO THIS DOCUMENT AND ARE ATTACHED:

CONTENTS

THE FOLLOWING TECHNICAL SUPPORT DOCUMENTS ARE APPENDICES BY REFERENCE AND ARE NOT ATTACHED TO THIS DOCUMENT:

FIGURES

THE FOLLOWING FIGURES ARE OVERSIZED AND ARE NOT ATTACHED TO THIS DOCUMENT. THEY ARE, HOWEVER, AVAILABLE UPON REQUEST:

SEISMIC SAFETY AND SAFETY ELEMENTS

INTRODUCTION

The California State Legislature, through requirements of the Seismic Safety and Safety Elements, has placed specific responsibilities on local government for identification and evaluation of natural hazards and formation of programs and regulations to reduce risk. Specific authority is derived from Government Code Section 65302(f) and 65302.1, which require Seismic Safety and Safety Elements of all City and County General Plans.

The effect of these sections is to require the City of Santa Maria to take seismic and other natural hazards into account in its planning programs. The principal catalyst for this requirement was the February 9, 1971, San Fernando earthquake in which 65 people were killed, and property damage exceeded one-half billion dollars. Conclusions from the 1973 Urban Geology Master Plan for California also give reason for considering geologic hazards in the planning process. Summary conclusions from this study estimate dollar losses due to geologic hazards in California between 1970 and 2000 will amount to more than $55 billion.

PURPOSE

The basic objectives of the Seismic Safety and Safety Elements are to identify and evaluate natural hazards confronting Santa Maria and to recommend policies that would reduce the adverse impact of these hazards Specifically, these elements evaluate both primary and secondary seismic hazards, flooding, fire, and our ability to provide a positive response to such emergencies. The intent of the recommended policies is to provide an opportunity to reduce the loss of life, property damage, and social and economic dislocations in the event of a major earthquake, flood, or fire.

The premise underlying the planning recommendations made in this report is that we should incorporate natural hazards analysis into the planning process based on what we know today, rather than waiting until we know all that we would like to know.

TYPES OF HAZARDS

Three basic groups of natural hazards are considered in this document: Seismic and geologic; flooding; and fire hazards. There are several types of seismic hazards which can be grouped in a cause-and-effect classification that is the basis for the order of their consideration. Earthquakes originate as shock waves generated by movement along an active fault. The primary seismic hazards are ground shaking and the potential for ground rupture along the surface trace of the fault. Secondary seismic hazards result from the interaction of ground shaking with existing soil and bedrock conditions, and include liquefaction, settlement, landslides, tsunamis or "tidal waves", and seiches (oscillating waves in lakes and reservoirs).

The potentially-damaging natural events (hazards) discussed above may interact with man-made structures. If a structure is unable to accomodate the natural event, failure will occur. The potential for such failure is termed a structural hazard, and includes not only structures themselves, but also the potential for damage or injury that could occur as the result of movement of loose or inadequately restrained objects within, on, or adjacent to a structure.

Flooding hazards in the City of Santa Maria may be considered in two categories: natural flooding and dam inundation. "Natural flooding" hazards are those associated with major atmospheric events that result in the inundation of developed areas due to overflows of nearby stream courses, or inadequacies in local storm drain facilities. Dam inundation hazards are those associated with the downstream inundation that would occur given a major structural failure in a nearby water impoundment.

Fire hazards considered in this report are from wildland fires. Wildland fires are those which burn in primarily undeveloped areas and result from the ignition of accumulated brush and wood material.

HAZARD DELINEATION

The areal distribution of seismic, wildland fire, and flooding hazards in the City of Santa Maria are shown on Plates I and II. Discussions of the analyses of these hazards are presented below as background for the recommended policies.

SEISMIC HAZARDS

The seismic hazards affecting the City of Santa Maria and its planning area are analyzed in a general manner in the County of Santa Barbara Seismic Safety Element (Livingston and Blayney, 1974). The most significant seismic hazard to Santa Maria is ground shaking. Other seismic hazards, which should be incorporated into future planning considerations by the City, include slope instability and liquefaction.

SEISMIC SETTING

The City of Santa Maria is located in a seismically active area, in close proximity to several of the many active and potentially active earthquake faults in Central California. There are two faults in the immediate area. The Bradley Canyon fault, which is located 5 miles east of Santa Maria and is classified as potentially active. The Santa Maria fault runs beneath the City and is considered inactive. (Livingston and Blayney, 1974). The San Andreas fault, 40 miles to the northeast, and the Nacimiento-Rinconada fault zone, 18 miles to the northeast, are expected to be the principal sources of significant future earthquakes (Envicom, 1974, and Livingston and Blayney, 1974).

The San Andreas fault is the most likely source of strong earthquake shaking in the City of Santa Maria. Analysis of the seismicity, accumulating crustal strain, and geologic slip indicates that a "great" earthquake (magnitude 8.0 - 8.5) can be expected at any time (Envicom, 1974). The recurrence interval of a magnitude 8.0 - 8.5 event on the portion of the San Andreas fault closest to Santa Maria has been interpreted to be approximately 100-150 years. Since the last movement on this portion occured in 1857 (magnitude 8.0 - 8.5), and 119 years have already passed, one must conclude that another major event is imminent.

The expected earthquake on the San Andreas fault will provide the most significant degree of ground shaking in the City in terms of both duration and intensity. The maximum ground acceleration expected in Santa Maria from such an earthquake is 20% gravity. (Envicom, 1974).

The potential seismic hazards for the Santa Maria area are described below:

1. Slope Instability. Landslides represent only one step in the continuous, natural erosional process. They demonstrate in a dramatic way the tendency of natural processes to seek a condition of equilibrium. The steep slopes of mountainous and hillside terrain are not in a state of equilibrium, and various erosional processes act to gradully reduce them to a base level. Landsliding is an important agent in this cycle.

   Landsliding is basically controlled by four factors. The rock type or geologic formation is a reasonably good indicator of the strength of the rock and its resistance to failure. The geologic structure or the orientation of potential failure planes is important in determining the size and type of failure. The amount of available water greatly influences the strength of a slope. The potential for landsliding is low due to the geologic structure and rock type in the Santa Maria area.

2. Liquefaction. Liquefaction involves a sudden loss in strength of a saturated cohesionless soil (predominantly fine grained sand) which is caused by shock or strain (such as an earthquake), and results in temporary transformation of the soil to a fluid mass. If the liquefying layer is near the surface, the effects are much like

that of quicksand on any structure located on it. If the layer is in the sub-surface, it may provide a sliding surface for the material water is less than 30 feet from the surface and where the soils are composed of poorly consolidated fine to medium sand. In addition to the necessary soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to bring on liquefaction.

The liquefaction potential is low for most of Santa Maria planning area since the groundwater over most of the area is deeper than 80 feet (Department of Water Resources, State of California, 1972). However, there is an area of shallow perched groundwater in the vicinity of the airport. The shallow water table is apparently seasonal, although little is known of the areal extent or the exact nature of its existence. This shallow groundwater zone, shown approximately on Plate I, must be assigned a high liquefaction potential at this time, although subsequent study may indicate a lower potential is justified.

3. Settlement. Settlement may occur in unconsolidated soils during earthquake shaking as the result of a more efficient re-arrangement of the individual soil particles. Settlements of sufficient magnitude to cause significant structural damage are normally associated with rapidly deposited alluvial material, or material, or improperly founded or poorly compacted fills. The only locations, outside of the high liquefaction area, which may experience significant settlement during an earthquake, are the sanitary landfill at the northeast corner of the planning area, and the several localized unauthorized landfill sites shown on Plate I.

4. Tsunamis. Tsunamis are seismic sea waves generated primarily by vertical offsets of the sea floor that accompany submarine faulting. They typically affect low-lying coastal areas, and hence will have no probable effect on the Santa Maria area.

5. Seiches. Seiches are standing waves produced in a body of water by winds, atmospheric changes, the passage of earthquake waves, etc.

   Seismic Seiches are not considered as constituting a significant hazard in open bodies of water in the study area, although the effects of seiching may be important in storage tanks within the Santa Maria area.

6. Dam Inundation. The only significant dam in the vicinity which could affect the planning area in the event of collapse during a major earthquake is Twitchell Dam. The dam, constructed by the Bureau of Reclamation in 1958, is primarily for groundwater recharge and flood control. It is an earthfill dam, 216 feet high, with a storage capacity of over 240,000 acre-feet. It is important to point out that, while the subject of total dam failure will be discussed herein, the probability of its occurance is remote, particularly in light of the fact that the dam impounds water only periodically and is not a reservoir.

Inundation studies have been performed for Twitchell Dam under State law, but have not been certified by the State Office of Emergency Services. Until the studies are certified by O.E.S., they are not available to the public. It is likely, though, that a significant portion of the study area will be inundated in the improbable event that Twitchell Dam fails when filled to capacity during an earthquake.

Localized flooding potential exists along portions of the Santa Maria Levee. The areas of potential inundation have been established by the County Engineer. These problems can be considered short-term depending on the committment to repairing the levee against potential "failures".

Seismic Zones in Santa Maria

Study indicates that the Santa Maria area can be subdivided into three distinct seimic zones, as shown on Plate I. These zones can be described as follows:

Zone A	-	All areas underlain by Recent-age alluvium.
Zone B	-	All areas underlain by Pleistocene-age non-marine terrace deposits.
Zone C	-	All areas underlain by Tertiary-age marine sediments.

In general "A" is the "most hazardous" and "C" the least.

SEISMIC RISK

Given that certain seismic hazards exist in Santa Maria, it is necessary to decide whether the risks these hazards present are acceptable or whether action is necessary to reduce the level of risk. The Council on Intergovernmental Relations (CIR) (The functions of CIR are currently performed by the Office of Planning and Research) defines:

1. Acceptable Risk: The level of risk below which no specific action by government is deemed to be necessary.

2. Unacceptable Risk: The level of risk above which specific action by government is deemed to be necessary to protect life and property.

3. Avoidable Risk: A risk which need not be taken because individual or public goals can be achieved at the same, or less, total "cost" by other means without taking the risk.

To determine levels of acceptable risk is to provide an answer to the question "How safe is safe enough?" No environment is perfectly hazard-free. Natural and man-made hazards of some kind are always present, especially in urban environments. However, some hazards cause only minimal loss or occur so rarely that they need not be planned for at the community level. On the other hand, some events occur often enough, are large enough, and have the potential for major disruption of the community such that a community-wide response to the risk is called for. Deciding the level of response to natural hazards such as earthquakes is a public process which involves making a judgment, either explicit or implicit, about acceptable risk.

As discussed under Seismic Setting, since the expected magnitude 8.0 - 8.5 earthquake along the portion of the San Andreas fault closest to Santa Maria will override the effects of eathquakes from more localized faults, it is felt that it is the only earthquake that need be considered in the acceptable risk determination.

The determination of acceptable risk also involves differentiating among man-made structures according to their potential effect on the loss of life and their importance in terms of emergency response and continued community functioning. In the hours immediately following the 1971 San Fernando earthquake in Southern California, emergency services were impaired by damage to police and fire stations, communication networks and utility lines. A number of major hospitals in the area were seriously damaged and were unable to continue functioning at the time they were needed most. These facilities and others are vital to the community's ability to respond to a major disaster and to minimize loss of life and property. The experience in San Fernando emphasizes the need to provide these "critical facilties" a higher level of protection from earthquakes than non-critical structures.

"Critical facilities", on the other hand, should not only remain standing, but should be able to operate at peak efficiency during and after the earthquake.

Designing a building to this higher level of seismic safety entails not only a stronger structure, but also greater attention to non-structural items such as elevators, lighting, and storage facilities.

Deciding which types of facilities are to be considered critical and non-critical is part of the public decision on acceptable risk. The following Table presents the recommended categorization of buildings:

TABLE I

TAXONOMY OF FACILITIES

Category	Facility/Activity
Critical Facilities	Hospital, fire stations, police stations, civil defense headquarters, gas, electric, water "lifelines", ambulance services, emergency broadcast services, and power plants.
Non-Critical Facilities	All facilities not listed above.

WILDLAND FIRE HAZARDS

The major emphasis of this investigation is the analysis and evaluation of fire hazards originating in the undeveloped portion of the City of Santa Maria and vicinity. Fires in undeveloped areas usually result from the ignition of grasses and brush material, and are often "wildland fires." However, such terminology more aptly applies to areas involving extensive tracts of mountainous, brush-covered terrain uncharacteristic of the Santa Maria area. For that reason, this investigation will summarize the potential for more limited grassland and brush fires by identifying the presence or absence of contributing factors, such as climate, vegetation, slope, and human proximity. Contributing factors are:

1. Climate. Santa Maria and vicinity possesses a moderately cool Mediterranean climate, characteristic of coastal central California. Average monthly temperatures range from a minimum of 50 degrees F. in January to a maximum of 63 degress F. in August and September. Rainfall also shows a seasonal variation, with the month of February ranking as the wettest month with 2.4 inches of rainfall and the period of June through August the driest, when essentially no rainfall is recorded in the area. However, even during the summer, the moderating influence of moist on-shore marine air movement helps maintain a level of humidity in the area. Moist air decreases fire hazard by maintaining high moisture contents in the leaves and tissues of the local vegetation. This condition reduces the likelihood of a field or hillside igniting into a large conflagration.

2. Vegetation. The vegetation of an area provides the fuel for brush and grass fires, therefore determining the potential for fire and the type of fire most likely to occur. The two major, naturally-occuring vegetative communities in the Santa Maria area are oak savannah and coastal sage scrub. The remainder of the study area has been disturbed, either through urbanization or cultivation.

Coastal sage scrub ranks as one of the more flammable plant communities encountered in California.

The oak savannah community also ranks as a potentially flammable vegetative type. Fires in oak savannahs usually involve the grassland portion of the community, and, only in extreme cases do resident oak trees ignite. Grass fires often spread very rapidly, but do not develop the intensity encountered during brush fire situations. However, grass associated fires can threaten structures as well as other improvements if left uncontrolled.

3. Slope. The third major contributing factor to fire hazard is slope, relating to the presence of steep hillsides and canyons that can create potentially dangerous wind drafts during fire outbreaks. Slope may also limit the strategy a fire protection agency can employ in combatting a fire. Fires on slopes, that are less than 20%, can be fought with ground personnel and four-wheel drive vehicles.

   Slopes in the study area are generally very shallow, ranging less than 10%. However, in the Casmalia and Solomon Hills, slopes often approach 25%, and certain areas measure approximately 40%. Thus, slope-related fire problems are localized in the hilly portions of the area south and west of Orcutt.

4. Human Proximity. Human proximity refers to the presence of human activity in brush and grassland settings, and is probably the most significant determinant of overall fire risk. The human element is often essential to the ignition of major brush fires, as is evidenced by the frequency of burns resulting from the following activities or occurences:

Relative Percentage of Fire Starts on State-Wide Basis	Activity
22.0%	Arson
6.1%	Debris-burning
23.0%	Power Line Failures
16.0%	Machinery Operation
67.1%	Human-Related Fire Occurance

Source: California Division of Forestry, 1972.

The effects of human proximity are readily visible in the hazard assessment for Santa Maria and vicinity. Machinery operation growth to the south of Orcutt are two examples of potential ignition sources existing in brush, or grass-covered areas. The hazard ranking for these areas reflect the presence of this significant risk contributor.

Risk Assessment

The Santa Maria area is exposed to certain fire risks in its undeveloped portions; however, these risks are localized, and are relatively minor when viewed from a regional perspective.

The most significant brush fire hazards are associated with the coastal sage scrub and grass-covered slopes in the Casmalia and Solomon Hills, to the south of the City. In this area, the factors of vegetation, slope and human proximity interact to create the most significant relative level of risk (Zone 1 on Plate II).

The oak savannah hillsides to the east of U.S. 101, and north of Clark Avenue represent the second-ranking undeveloped fire hazard in the area (Zone 2 on Plate II). The native vegetation which remains in this general location could ignite and create a localized hazard. A fire in this vicinity would not be as vigorous, nor as difficult to control, as a similar outbreak in the Casmalia and Solomon Hills.

A third type of fire risk is generated by the development of the Santa Maria Valley Oil Field (Zone 3 on Plate II). The presence of flammable liquids and spark-producing machinery create the possibility of fire initially fueled by residual petroleum that could spread to grasses and weeds growing near the wells and pipelines. Although the likelihood of such fires is small because of safety percautions in the field, they have been known to occur. The catastrophic Clampett fire of 1970 in Los Angeles County, which burned over 100,000 acres of brush and destroyed dozens of structures, originated in a similar manner.

The remaining areas of Santa Maria (Zone 4 on Plate II) are generally protected from most aspects of grassland and brush fire. However, accumulating weeds along roadsides and in vacant lots make even urban locations potentially hazardous from a non-structural fire standpoint. For these reasons, it is very important that a moderately-developed City such as Santa Maria remain sensitive to weed abatement <u>wherever</u> structures are present.

NATURAL FLOODING HAZARDS

The Mediterranean climate of the Santa Maria area is characterized by three features: 1) moderately abundant rainfall concentrated in the winter seasons with summers being nearly or completely dry; 2) mild to

warm summers and mild winters; and 3) a high percentage of sunshine throughout the year, particularly during the summer. Snowfall as a entirely absent from the valley floor, and is generally light in the mountain areas.

Rainfall-producing storms which occur over the Santa Maria area are of two general types. The most common type occurs in the winter, and results from the passage of one or more extratropical cyclones over the basin. Winter cyclonic disturbances characteristically bring rain over large areas, and generally approach the study area from the northwest. Most flooding episodes in the past have accompanied these winter storms.

The second type of storm usually occurs as a result of local convergence, or thunder storm activity. Storms of this type are not restricted to certain periods; however, they are more likely to occur during the warmer months of the year. Thunder storms often yield intense precipitation over fairly limited periods of time, thus creating short-lived flooding situations.

Risk Assessment

For the purposes of this report, the flooding associated with the 100-year storm will be of primary consideration. Such a storm has a statistical likelihood of occuring once in a hundred year span, or a 1% chance of occuring in any given year. The 100-year flood can occur in any year or even more than once during a year, though such an event is not "likely".

The 100-year flood determination is becoming an accepted standard for flood protection by agencies involved in the assessment of flood risks. The Department of Housing and Urban Development (HUD), in their issuance of flood insurance as part of the Flood Protection Disaster Act of 1974, has adopted the 100-year flood level as the determinant of the flood plain area having a hazard potential requiring specified controls or protective measures.

Plate II shows the 100-year flood plain for the City of Santa Maria and vicinity, based on available data from the United States Geological Survey and HUD. The levee, constructed by the U.S. Army Corps of Engineers, along the Santa Maria River was designed to accomodate a 100-year flood, but additional flooding can be expected along the east side of Highway 101 (Plate II). Additional local flooding can be expected along West Main Street and in the vicinity of the gravel pits north of the City.

WATER AVAILABILITY

The ability of the area's water system to produce adequate fire fighting

flows is critical to community safety. In general the State Fire Marshall requires a minimum of 500 gallons per minute for urbanized areas. Most urbanized portions of the Santa Maria planning area have hydrant coverage with flows of 1,000 - 2,000 gallons per minute. However, it should be noted that many proximate undeveloped lands have no coverage. Likewise some isolated commerical and industrial uses on West Betteravia Road are similarly not serviced by any flow capacity.

The provision of such flows is recognized as a prerequisite for urbanization of remaining lands within the planning area.

It should be noted that fire flows provided in urbanized portions of the planning area do not address the primary fire consideration of this document - wildland fires.

EVACUATION ROUTES

The City has major entry points from all four directions, as do most portions of the planning area. The only possible exceptions are some of the partially urbanized areas south of Clark Avenue which do not have alternative egress/ingress routes.

Because of the general topography of the planning area, the physical alternatives for possible evacuation are varied from most points.

In general the greatest concern in evacuation may be traffic control and management, not the absence or inadequacy of routes. The control and management of traffic at such time as evacuation is necessary should be a major component of the City's disaster preparedness effort.

DEALING WITH THE PROBLEM

The previous section of this document was a description, a synthesis of the existing natural hazards in the City of Santa Maria, summarizing the general framework within which planning for seismic safety and public safety should take place. In this section, recommendations are presented which encompass general planning goals and policies and specific planning actions pertaining to hazard reduction.

GOALS

To plan effectively for reducing hazards to acceptable levels of risk, it is necessary that goals be set and adhered to. Goals address general policy directions which form the basis for planning decisions and actions. The recommended goals for minimizing the destructive effects of hazardous natural events in the City of Santa Maria are:

1. To protect life, property, and public well-being from fire, geologic, natural and man induced hazard conditions;

2. To reduce or avoid adverse social, economic, and environmental impacts caused by these hazard conditions;

3. To reduce the personal and social risks related to safety hazards.

4. Improve inter-jurisdictional cooperation and communication especially in regard to safety aspects related to dams, reservoirs, state highway and freeway structures, oil wells, regional fault studies, legislative matters, and disaster response or emergency plans.

More specifically, the following sub-goals embody what the City of Santa Maria is attempting to achieve through the adoption and implementation of this element. It should be noted that many of these goals are already implicit in the policies and day-to-day actions of the City. Their re-affirmation combines with new sub-goals to set an explicit direction for the City.

Seismic and Geologic Hazards

1. Minimize the potential risks from an earthquake through incorporating seismic considerations in the planning/development process.

2. Minimize risks from seismic hazard through disaster preparedness programs.

3. Provide regulations to insure that structures built on soils with limited ability to support them are designed in such a manner to compensate for support limitations.

4. To maintain, revise (whenever necessary), and enforce existing standards and criteria to reduce or avoid all levels of seismic or other geologic risk, whether it be unacceptable, tolerated, or avoidable risk.

Fire Hazard

1. Minimize the risks from existing fire hazards through the enforcement of fire safety codes and prevention programs.

2. Minimize risks from existing fire hazards through upgrading of fire protection and fire fighting facilities and services.

3. Minimize risks from future potential fire hazards by improving the design review process for increased awareness of fire control design of structures.

Natural Acts Hazards

1. Minimize risks from existing flood hazards by incorporating of flood considerations in the planning/development process.

2. Minimize risks from flood hazards through disaster preparedness programs.

3. Minimize risks from flood hazards through enforcement of local, State and Federal regulations for structures, and grading.

4. Minimize risks from potential wind hazards by upgrading and enforcement of local, State and Federal regulations for structures, mobile homes and grading.

POLICIES AND PROGRAMS

The implementation recommendations in this section are intended to provide the City with a series of specific actions - in terms of policies and programs - to achieve the goals of these Elements. While it is advisable to fully implement each of the recommended actions, it is recognized that unlimited resources to that end are not available. These recommendations should be thought of, then, as options to be implemented as resources provide.

Evaluation of Structural Hazards

1. Structures within the study area should be inspected for confortions. Inspections should be conducted according to the priorities based on two criteria: (1) the facility type, and (2) the age of the building with respect to improvements in seismic design requirements in building laws. The significance of the year 1933, for example, is that the Field and Riley Acts became law in California that year and required reinforcement in public schools and certain other structures. Structures built prior to 1933, especially larger commercial structures, are more likely to be unreinforced masonry block buildings which are most susceptible to collapse in earthquakes.

   It is also recommended that, within each inspection priority group, publicly-owned structures be inspected before private structures.

   Specific inspection criteria should be established by qualified structural engineers using the ground motion data contained in the Seismic Hazards section of this report. Table III is provided to give some general criteria of earthquake-resistive features which can be used in establishing additional inspection priorities. Buildings which could be classified according to the table as having a damageability rating of five or higher should be inspected first. A high priority should be placed on evaluating the seismic vulnerability of facilities that handle explosive, flammable, or toxic materials.

2. Caltrans should be requested to review its facilities and roadways within the study area to determine the potential impact of expected earthquakes and floods, and should forward comments to the City. The Circulation Element of the General Plan and potential evacuation routes should be revised, if necessary, based on that analysis.

3. Santa Maria Valley Railroad Company should review its lines and yards within the study area to determine the potential impact of the expected earthquakes, and should forward comments to the City.

4. The Pacific Gas and Electric Company and Southern California Gas Company should continue to review their facilities and distribution/transmission networks and centers to determine fire hazards and potential impact of expected earthquakes. These reviews should insure adequate service and secure safety to the public pursuant to the standards of contruction, operation, and maintenance mandated by the California Public Utilities Commission.

5. Twitchell Dam should be inspected by qualified structural engineers to determine its ability to withstand the ground shaking criteria presented in this report.

6. The Santa Maria Fire Department should establish and maintain an inspection program to identify fire hazards within their juris-

diction. Rigid inspection standards for off-road vehicles (muffler and spark arrester controls) should also be established, and the be controlled.

7. Structures identified as not conforming to amended earthquake standards should be brought into conformance with acceptable levels of risk by programs including, but not limited to, structural rehabilitation, occupancy reduction, and demolition and reconstruction.

8. A review committee should be established by the City Council to consider the desirability of initiating condemnation proceedings against structures found to be unsafe.

9. The City should advocate the expansion of State and Federal relocation assistance funds and programs to aid persons and businesses displaced from hazardous buildings.

TABLE II

STRUCTURAL INSPECTION SEQUENCE MATRIX

(Numbers show the order in which structures should be inspected for seismic safety.)

FACILITY TYPE	PRE-1933 RILEY ACT BUILDINGS	AFTER 1933, BEFORE 1961, UBC	AFTER 1961 UBC, BEFORE NEW CODE
CRITICAL	1	2	4
NON-CRITICAL	3	5	6

TABLE III

HAZARD COMPARISION OF NON-EARTHQUAKE-RESISTIVE BUILDINGS

Simplified Description of Structural Type	Relative Damage Ability (in order of increasing susceptibility to damage)
Small wood-frame structures, i.e. dwellings not over 3,000 sq. ft. and not over 3 stories	1
Single or multi-story steel-frame buildings with concrete exterior walls, concrete floors, and concrete roof. Moderate wall openings	1.5
Single or multi-story reinforced-concrete building with concrete exterior walls, concrete walls, and concrete roof. Moderate wall openings	2
Large area wood-frame buildings and other wood frame buildings	3 to 4
Single or multi-story steel-frame buildings with unreinforced masonry exterior wall panels; concrete floors and concrete roof	4
Single or multi-story reinforced-concrete frame buildings with unreinforced masonry exterior wall panels, concrete floors and concrete roof	5
Reinforced concrete bearing walls with supported floors and roof of any material (usually wood)	5
Buildings with unreinforced brick masonry having sand-lime mortar; and with supported floors and roof any material (usually wood)	7
Bearing walls of unreinforced adobe, unreinforced hollow concrete block, or unreinforced hollow tile	Collapse hazard in moderate shocks

This table is intended for buildings not containing earthquake bracing, and in general, is applicable to most older construction. Unfavorable foundation conditions and/or dangerous roof tanks can increase the earthquake hazard greatly.

Standards for New Construction

1. Using the geological and acceptable risk data provided in the Seismic Safety/Public Safety Element, the City's Building Code should be reviewed by a qualified structural engineer to determine new earthquake regulations. Evaluation of the lateral force requirements of the 1976 Uniform Building Code should be included as the central part of revisions of the City's earthquake regulations.

2. All new construction permitted in the City should be built according to the revised earthquake regulations of the Uniform Building Code (1976 edition).

Land Use Regulations

1. Any development in the areas of slopes should be required to conduct detailed slope stability investigations at the site level.

2. Critical facilities should not be permitted to locate in areas of potential liquefaction, except for those public and private facilities which have been designed in accordance with the liquefaction, settling and ground shaking data provided in this report.

3. Critical facilities should be discouraged from locating within the 100-year flood plain and areas of potential dam inundation in the absence of mitigating engineering design. Non-critical facilities should be allowed to locate in potential flood plain areas only if the facilites are elevated or flood-proofed to the level of the 100-year flood.

4. Wood frame and other combustible structures, and untreated wood shake roofs, should be prohibited in the area of highest fire hazard.

Scientific Analysis

1. Require site-by-site soils and geologic engineering studies for proposed development projects in the few areas with slope gradients steeper than 20% to assess natural and graded slope stability. Slope stability calculations should incorporate ground shaking parameters presented in this report.

2. Continue strong-motion instrumentation program for buildings over four (4) stories in height, if such buildings are anticipated.

3. Encourage the early completion of dam inundation studies for Twitchell Dam. The structure should also be investigated for its ability to withstand the earthquakes which can be expected in the study area.

4. The ability of existing water storage facilities to withstand the expected seismic event on the San Andreas fault should be evaluated by qualified structural engineers.

Public Education

1. Develop an information release program to familiarize the citizens of the region with the Seismic and Safety Elements. Special attention should be afforded to those groups particularly susceptible to seismic, fire, and flooding hazards including, but not limited to, school districts, agencies involved with the aged, and agencies involved with handicapped persons. These agencies should be encouraged to develop educational programs of their own relative to hazard awareness. The conclusions and recommendations of these elements should also be provided to land developers and those involved in the real estate profession.

Disaster Response Planning

1. The City's Emergency Plan should be updated periodically. Emergency simulations such as Operation Shakey (May 1975) should be continued and expanded.

2. A committment to better disaster preparedness should be made. Specifically, the City should initiate a program of strengthening the communication and understanding between the vital agencies - public and private - necessary to activate at times of emergency.

Review and Maintenance

1. Upon adoption of the Seismic Safety and Safety Elements, a review committee should be established to oversee the implementation of the Elements and to advise the City Council of implementation progress.

2. The Seismic Safety and Safety Elements should be reviewed by the Community Development Department annually and should be comprehensively revised every five years or whenever substantially new scientific evidence becomes available.

Safety Standards

The City of Santa Maria shall periodically review and upgrade if necessary its comprehensive enforcement of safety standards for which it has primary implementation responsibility. These safety standards are dispersed among the following State or Federal Codes:

1. The Uniform Building Code.
2. Uniform Housing Code.
3. Uniform Plumbing Code.
4. National Electric Code.
5. Hazardous Building Code.
6. Uniform Fire Code.
7. State Health and Safety Code.

APPENDIX

APPENDIX A

ENVIRONMENTAL ASSESSMENT
OF THIS DOCUMENT
UNDER THE REQUIREMENTS OF THE
CALIFORNIA ENVIRONMENTAL QUALITY
ACT OF 1970 (CEQA)

This combined Seismic Safety/Public Safety Element deals directly with environmental concerns. Its goals, objectives, policies and programs address the mitigation of adverse influences arising out of environmental conditions, and man's interaction with these conditions.

It proposes no actions which could be construed as having negative environmental consequence. Rather, it proposes to avoid such consequences.

This document is itself an environmental assessment with appropriate mitigation measures as the only proposed actions.

For procedural considerations under CEQA, it will be processed with a Negative Declaration affirming this determination.

APPENDIX B

EMERGENCY PREPAREDNESS SCENARIO

FIRE PROTECTION

Departmental responsibilities for overall basic fire protection readiness exemplifies the need for coordination among the arms of City government.

I. WATER - DIVISION OF PUBLIC WORKS

a. Maintains a water supply for combatting fires.

b. Assures that the valving of distribution mains are maintained so as to provide maximum fire flow.

c. Performs major repairs and replacement of fire hydrants.

d. Responds a standby crew to greater alarm fires to assist with water supply problems.

e. Maintains records necessary to City's fire defense grading.

f. Inspects the connection of private fire protection systems to the water system and assures an adequate supply of water.

g. Provides current information to the Fire Department on hydrants and mains service status.

II. FIRE DEPARTMENT

a. Fire control and rescue.

b. Emergency medical aid and rescue.

c. Enforcement of Fire Code, Building Code, Nuisance Abatement Ordinance, and State Fire Marshall's regulations.

d. Control of fire hazards and causes.

e. Respond to non-emergency "Public Assistance Calls".

f. Maintains firefighting equipment and facilities.

g. Maintains fire hydrants and their valving.

h. Informs and educates the public of fire safety measures.

i. Reviews new developments for necessary fire protection needs and compliance with applicable codes and ordinances.

j. Fire protection system management and evaluation.

k. Weed abatement program.

III. PLANNING DIVISION

a. Provides information for the analysis of community fire protection needs.

b. Controls new developments as to location in the City, access, separation of buildings, and the requirement of necessary fire protection features.

c. Considers fire protection resources when regulating height, density and types of developments.

d. Provides follow-up on the Fire Department's enforcement of the Nuisance Abatement Ordinance.

e. Provides staff coordination on the review of new developments.

IV. BUILDING DIVISION

a. Enforcement of local building code in building construction and alteration. A portion of this code directly relates to fire protection systems, fire resistance, life safety, and control of hazards of building mechanical systems.

b. Occupancy classification and permits which control the changing use of buildings to assure compliance with minimum fire and life safety requirements.

c. Assignment of street numbers and approval of unit identification systems for ready location during emergencies.

d. Rehabilitation and dangerous building program which corrects structural deficiencies (including fire protection problems) in older structures.

V. POLICE DEPARTMENT

a. Provides crowd and traffic control at scenes of emergencies.

b. Enforces parking regulations which assure access to scenes of emergencies, fire hydrants, and fire service connections.

c. Conducts the criminal investigation of incendiary fires.

d. Reports fire and fire hazards during patrols.

VI. ENGINEERING DIVISION OF PUBLIC WORKS DEPARTMENT

a. Considers emergency response routes in designing traffic systems and street designs.

b. Provides engineering expertise to the Fire Department in the review of plans for private and public fire protection systems.

c. Maintains maps of utility distribution systems, streets, City boundaries and topography for the use in planning for emergency operations.

VII. PERSONNEL SECTION

a. Provides for the employement of qualified paid personnel and reserve firefighters.

b. Coordinates the employee training and education system for the development of each employee's potential.

c. Manages employee retirement and insurance programs to assist in retention of employees.

VIII. CORPORATE YARD (PUBLIC WORKS DEPARTMENT)

a. Major repairs of fire apparatus.

b. Emergency repairs and fueling of apparatus at emergency scenes.

c. Technical assistance in the preparation of apparatus specifications.

d. Training of personnel in the operation and maintenance of fire apparatus.

APPENDIX C

TERMS

Active Fault - One that has moved in recent geologic time and which is likely to move again in the relatively near future. Definitions for planning purposes extend on the order of 10,000 years or more back and 100 years or more forward.

Alluvial - Pertaining to or composed of alluvium, or deposited by a stream or running water. (AGI, 1972)

Cohesion - Shear strength in a sediment not related to interparticle friction. (AGI, 1972)

Damping - The resistance to vibration that causes a decay of motion with time or distance, e.g. the diminishing amplitude of an oscillation. (AGI, 1972)

Displacement - (Geological) - The relative movement of the two sides of a fault, measures in any chosen direction; also, the specific amount of such movement. Displacement in an apparently lateral direction includes strike-slip and strike separation; displacement in an apparently vertical direction includes dip-slip and dip separation. (AGI, 1972)

Fault - A surface or zone of rock fracture along which there has been displacement, from a few centimeters to a few kilometers in scale. (AGI, 1972)

Fault Zone - A fault zone is expressed as a zone of numerous small fractures or by breccia or fault gouge. A fault zone may be as wide as hundreds of meters. (AGI, 1972)

Intensity - (earthquake) - A measure of the effects of an earthquake at a particular place on human and/or structures. The intensity at a point depends not only upon the strength of the earthquake, or the earthquake magnitude, but also upon the distance from the point to the epicenter and the local geology at the point. (AGI, 1972)

Liquefaction - A sudden large decrease in the shearing resistance of a cohesionless soil, caused by a collapse of the structure by shock or strain, and associated with a sudden but temporary increase of the pore fluid pressure. (AGI, 1972)

Magnitude - (earthquake) - A measure of the strength of an earthquake or the strain energy released by it, as determined by seismographic observations. As defined by Richter, it is the logarithm, to the base 10, of the amplitude in microns

of the largest trade deflection that would be observed on a standard torsion seismograph (static magnification = 2800; period = 0.8 sec; damping constant = 0.8) at a distance of 100 kilometers from the epicenter. (AGI, 1972)

Seiche - All standing waves on any body of water whose period is determined by resonant characteristics of the containing basin as controlled by its physical dimensions. (U.S. Geol. Survey Prof. Paper 544-E)

Subsidence - A local mass movement that involves principally the gradual downward settling or sinking of the solid Earth's surface with little or no horizontal motion and that does not occur along a free surface (not the result of a landslide or failure of a slope). (AGI, 1972)

Tsunami - A gravitational sea wave produced by any large-scale, short-duration disturbance of the ocean floor, principally by a shallow submarine earthquake, but also by submarine earth movement, subsidence, or volcanic eruption, characterized by great speed of propogation (up to 950 km/hr.), long wavelength (up to 200 dm.), long period (5 min. to a few hours, generally 10 - 60 min.), and low observable amplitude on the open sea, although it may pile up to great heights (30 m. or more) and cause considerable damage on turning shallow water along an exposed coast, often thousands of kilometers from the source. (AGI, 1972)

PLATE I

SEISMIC ZONES MAP

(OVERSIZE PAGE - AVAILABLE UPON REQUEST)

PLATE II

WILD FIRE AND FLOODING MAP

(OVERSIZE PAGE - AVAILABLE UPON REQUEST)